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The application/cms media type
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Abstract

This document registers the application/cms media types for use with the corresponding CMS (Cryptographic Message Syntax) content types.

Status of this Memo

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application/cms Media Type

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1. Introduction

[RFC5751] registered the application/pkcs7-mime media type. That document defined five optional smime-type parameters. The smime-type parameter originally conveyed details about the security applied (signed or enveloped) to the data content type, hence signed-data and enveloped-data, the name of the data, and was later expanded to also indicate that the message was compressed, compressed-data, and that the message is a certs-only message. This document does not affect those registrations as this document places no requirements on S/MIME (Secure Multipurpose Internet Mail Extensions) agents.

The registration done by the S/MIME documents was done assuming that there would be a MIME (Multipurpose Internet Mail Extensions) wrapping layer around each of the different enveloping contents, thus there was no need to include more than one item in each smime-type. This is no longer the case with some of the more advanced enveloping types. Some protocols such as the CMC (Certificate Management over Cryptographic Message Syntax) [RFC5273] have defined additional S/MIME types. New protocols that intend to wrap MIME content should continue to define a smime-type string, however new protocols that intend to wrap non-mime types should use this mechanism instead.

CMS (Cryptographic Message Syntax) [RFC5652] associates a content type identifier (OID) with a content; CMS content types have been widely used to define contents that can be enveloped using other CMS content types and to define enveloping content types some of which provide security services. CMS protecting content types, those that provide security services, include: Signed Data [RFC5652], Enveloped Data [RFC5652], Digest Data [RFC5652], Encrypted Data [RFC5652], Authenticated Data [RFC5652], Authenticated Enveloped Data [RFC5083], and Encrypted Key Package [RFC6032]. CMS non-protecting content types, those that provide no security services but encapsulate other CMS content types, include: Content Information [RFC5652], Compressed Data [RFC3274], Content Collection [RFC4073], and Content With Attributes [RFC4073]. Then, there are the inner most content types that include: Data [RFC5652], Asymmetric Key Package [RFC5958], Symmetric Key Package [RFC6031], Firmware Package [RFC4108], Firmware Package Load Receipt [RFC4108], Firmware Package Load Error [RFC4108], Trust Anchor List [RFC5914], id-ct-KP-keyPackageReceipt [ID.housley-keypackage-receipt-n-error], TAMP Status Query, TAMP Status Response, TAMP Update, TAMP Update Confirm, TAMP Apex Update, TAMP Apex Update Confirmation, TAMP Community Update Confirm, TAMP

Sequence Adjust, TAMP Sequence Adjust Confirmation, TAMP Error [[RFC5934](#)], Key Package Error, and Key Package Receipt [ID.housley-keypackage-receipt-n-error].

To support conveying CMS content types, this document defines a media

type and parameters that indicate the enveloping and embedded CMS content types.

New CMS content types should be affirmative in defining the string that identifies the new content type and should additionally define if the new content type is expected to appear in the encapsulatedContent or innerContent field.

[1.1](#). Requirements Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)].

[2](#). CMS Media Type Registration Applications

This section provides the media type registration application for the application/cms media type (see [[RFC6838](#)], [Section 5.6](#)).

Type name: application

Subtype name: cms

Required parameters: None.

Optional parameters:

encapsulatingContent=y; where y is one or more CMS ECT (Encapsulating Content Type) identifiers; multiple values are encapsulated in quotes and separated by a folding-whitespace comma folding-whitespace. ECT values are based on content types found in [[RFC3274](#)], [[RFC4073](#)], [[RFC5083](#)], [[RFC5652](#)], and [[RFC6032](#)]. This list can later be extended, see [Section 4](#).

authData

compressedData

contentCollection

contentInfo
contentWithAttrs
authEnvelopedData
encryptedKeyPkg
digestData
encryptedData
envelopedData
signedData

innerContent=x; where x is one or more CMS ICT (Inner Content Type) identifiers; multiple values encapsulated in quotes and are separated by a folding-whitespace comma folding-whitespace. ICT

values are based on content types found in [[RFC4108](#)], [[RFC5914](#)], [[RFC5934](#)], [[RFC5958](#)], [[RFC6031](#)], and [ID.housley-keypackage-receipt-n-error]. This list can later be extended, see [Section 4](#).

firmwarePackage
firmwareLoadReceipt
firmwareLoadError
aKeyPackage
sKeyPackage
trustAnchorList
tamp-status-query
tamp-status-response
tamp-update
tamp-update-confirm
tamp-apex-update
tamp-apex-update-confirm
tamp-community-update
tamp-community-update-confirm
tamp-sequence-adjust
tamp-sequence-adjust-confirm
tamp-error
keyPackageReceipt
keyPackageError

id-data [[RFC5652](#)] MUST NOT be used if it is the only inner content listed and the data is MIME content; when id-data is used to encapsulate MIME, the media type application/pkcs7-mime media type defined in [[RFC5751](#)] SHOULD be used.

The optional parameters are case-sensitive.

Encoding considerations:

Binary.

[RFC5652] requires that the outer most encapsulation be ContentInfo.

Security considerations:

The following security considerations apply:

RFC	CMS Protecting Content Type and Algorithms
[RFC3370]	signedData, envelopedData,
[RFC5652]	digestedData, encryptedData, and
[RFC5753]	authData
[RFC5754]	

[RFC5958]	aKeyPackage
[RFC5959]	
[RFC6162]	
[RFC6031]	sKeyPackage
[RFC6160]	
[RFC6032]	encryptedKeyPkg
[RFC6033]	
[RFC6161]	
[RFC5914]	trustAnchorList
[RFC3274]	compressedData
[RFC5083]	authEnvelopedData
[RFC5084]	
[RFC4073]	contentCollection and contentWithAttrs
[RFC4108]	firmwarePackage,

	firmwareLoadReceipt, and firmwareLoadError
-----+-----	
[RFC5934]	tamp-status-query, tamp-status-response, tamp-update, tamp-update-confirm, tamp-apex-update, tamp-apex-update-confirm, tamp-community-update, tamp-community-update-confirm, tamp-sequence-adjust, tamp-sequence-adjust-confirm, and tamp-error
-----+-----	
[ID.housley-keypackage-receipt-n-error]	 id-ct-KP-keyPackageReceipt and id-ct-KP-keyPackageError
-----+-----	

In some circumstances, significant information can be leaked by disclosing what the innermost ASN.1 structure is. In these cases it is acceptable to disclose the wrappers without disclosing the inner content type.

ASN.1 encoding rules (e.g., DER and BER) have a type-length-value structure, and it is easy to construct malicious content with invalid length fields that can cause buffer overrun conditions.

ASN.1 encoding rules allows for arbitrary levels of nesting, which may make it possible to construct malicious content that will cause a stack overflow. Interpreters of ASN.1 structures should be aware of these issues and should take appropriate measures to guard against buffer overflows and stack overruns in particular and malicious content in general.

Interoperability considerations:

See [RFC3274], [RFC4073], [RFC4108], [RFC5083], [RFC5652], [RFC5914], [RFC5934], [RFC5958], [RFC6031], [RFC6032], and [ID.housley-keypackage-receipt-n-error].

In all cases, CMS content types are encapsulated within ContentInfo structures [RFC5652]; that is the outer most enveloping structure

is ContentInfo.

When processing a SignedData around any of the inner content type the [RFC5652] validation rules MUST be used. The PKCS #7 [RFC2315] validation rules MUST NOT be used.

The Content-Type header field of all application/cms objects SHOULD include the optional "encapsulatingContent" and "innerContent" parameters.

The Content-Disposition header field [RFC4021] can also be included along with Content-Type's optional name parameter.

Published specification: This specification.

Applications which use this media type:

Applications that support CMS (Cryptographic Message Syntax) content types.

Additional information:

Magic number(s): None
File extension(s): .cmsc
Macintosh File Type Code(s):

Person & email address to contact for further information:

Sean Turner <turners@ieca.com>

Restrictions on usage: none

Author: Sean Turner <turners@ieca.com>

Intended usage: COMMON

Change controller: The IESG <iesg@ietf.org>

[3.](#) Example

The following is an example encrypted status response message:

MIIFLQYJKoZIhvcNAQcDoIIFHjCCBRoCAQAxggFhMIIIBXQIBADBFMEAcCzAJBgNVBAYTAlVTMR8wHQYDVQKExZUZXN0IENlcnRpZmLjYXRlc3AyMDExMRAwDgYDVQQDEwdHb29kIENBAgEBMA0GCSqGSIb3DQEBAQUABIIBAEa
 uaXQeVs0yZ7gz0pJikRQ6Jqr64k2dbHBE4SDZL/uErP9FJUija9LaJrc5S83EZ7wf3mODUBaDhGfQVKoPrNTsLmw98fE/O+wcdpI2XKaILOR62xDJR
 emQQST+EPfMwZmCwgsImmY3AxefAgzP8hVgK7SDiXGXfa9ux9PMdCSjHFIgcAUFHmTiqxYd72GL08kLCMIXmn3g5RsYUggxooeFNHiFNR28TV5HctGi6Ay5++iKUGrUQyXD+GlwakFToGfMfj3FMyZi7+kYV/X00BiBP3kpIgvJ
 4jCj+nYtKW6JXPoEqEsa39GmDEFGq4/58GEu70amWvW1DA++7kDP4gwg
 gOuBgkqhkiG9w0BBwEwHQYJYIZIAWUDBAECCBCH5yTQqZ4KYiTTeYdjoY4sgIIDgArSp0cengKnZS4SCjfUqkMxB5wfSaud1thlZ+gUFCgzbfTkfYM
 Qx/T7gnkneniyj2rw0mZxCQXpPLCDXH6mS83ngfrNN8ay3HrMPpVKE0mWUMc5jI6oNObwqi8a3ezzhYRxF06jzdD2R/6SAPALz3Q4NU8eX+PnuekgR
 oxo/INzhT4iGvokn9xVah6piSbjhPA+QZp1HgQrLWyyM3lG9jn4thchKL
 FQqZEy/EBaCWq+sJG7LLxqS5k29CiAVx0JSItqAPvX1ZvLMY2aq//MQMw
 0VFEx7Kt5aWNvKHTor9RUuuzwiZ5kwXt2vJt6bFiV7yS+EXofpFEmqyJP
 VJzyAFIXJRTv4k007n0M1UpXQpGjywECI6DbIhfBL8CsNskTCjrsfU+Tw
 RRkRKAbtJYughS9bDYkDu9UsKd/AE4zXk4prwo8/f1chpmzphK0XiWzt+
 xaCj648I4r0jdI9s4JP8J0qwVKoLEMGeiZlf2UlaiyMzZYzTOxI03PHp1
 Whk6TXhnmMVPWGyjjelVe38gq/XynobbQRGEJdnnHzH7SrS27FmgRcnBO
 3QQUPJChVn7iBHmdui++GaxpHoGdS6nSo4kQ6d5u5rL/Ctcnwu0k+s0Xi
 ZMz0qp7L31xl1jvYUWIsWLQYsIFoiejU3UTKzq/Cpd5MK+I8cwCM3aQ2c
 D08URTPgu+U92pnYqm3auptywyjGAU/hkZ13XN7YRhLk/kuX8QXo3tZdj
 dKA4f/uNf1DURpJK9004uCkxuAtu5HemMv7YPTTx9Ua2pZFW50+k2Mf2Z
 F/ge0vtNw7UV8w0T1nokXu9lnIZ9Xcs1cGGmRYE7jW15F07uGnMi1s2Gt
 LAST7t/PlTNZU6h0rVExErVa7T+VNidrgwGIke0YqYIwvTINRs+9VeJE3
 AJeatDlQs+01jrqqFWWmGmmsEBTTRuoDQHK7YBFFy4xIwQqZGW0EVre3
 OU5CL5LHIYiAVoV16YwiGd5WvFF8P1ZJK4ki8GFgYiMcPKmjQgP7DumqG
 n7eQtMD5tezTQeC07ntV3bi5pdznZHVcF2Kqg+qHjJQlhUdK7Pew3kq7k
 mfCdQv0BmQSYyjEAaTijaw4fAMxAbiw40U0eNeU//zcpp04AuTffJorIg
 oZ+iCTYei8HMUA9/ysLFXA64wdsuCj0zXmNiYwosisuNg3TXfoB0zohKq
 fkeXt

Standards tree using the applications provided in [Section 2](#) of this document.

IANA is also asked to establish two subtype registries called "CMS Encapsulating Content Types" and "CMS Inner Content Types". Entries in these registries is by Expert Review [[RFC5226](#)]. The Expert will determine whether the content is an ECT or an ICT; where the rule is that an ICT does not encapsulate another content type while an ECT does encapsulate another content type.

Initial values are as follows:

CMS Encapsulating Content Types

Name	Document	Object Identifier
authData	[RFC5652]	1.2.840.113549.1.9.16.1.2
compressedData	[RFC3274]	1.2.840.113549.1.9.16.1.9
contentCollection	[RFC4073]	1.2.840.113549.1.9.16.1.19
contentInfo	[RFC5652]	1.2.840.113549.1.9.16.1.6
contentWithAttrs	[RFC4073]	1.2.840.113549.1.9.16.1.20
authEnvelopedData	[RFC5083]	1.2.840.113549.1.9.16.1.23
encryptedKeyPkg	[RFC6030]	2.16.840.1.101.2.1.2.78.2
digestData	[RFC5652]	1.2.840.113549.1.9.16.1.5
encryptedData	[RFC5652]	1.2.840.113549.1.9.16.1.6
envelopedData	[RFC5652]	1.2.840.113549.1.9.16.1.3
signedData	[RFC5652]	1.2.840.113549.1.9.16.1.2

CMS Inner Content Types

Name	Document	Object Identifier
firmwarePackage	[RFC4108]	1.2.840.113549.1.9.16.1.16
firmwareLoadReceipt	[RFC4108]	1.2.840.113549.1.9.16.1.17
firmwareLoadError	[RFC4108]	1.2.840.113549.1.9.16.1.18
aKeyPackage	[RFC5958]	2.16.840.1.101.2.1.2.78.5
sKeyPackage	[RFC6031]	1.2.840.113549.1.9.16.1.25
trustAnchorList	[RFC5914]	1.2.840.113549.1.9.16.1.34
TAMP-statusQuery	[RFC5934]	2.16.840.1.101.2.1.2.77.1
TAMP-statusResponse	[RFC5934]	2.16.840.1.101.2.1.2.77.2
TAMP-update	[RFC5934]	2.16.840.1.101.2.1.2.77.3
TAMP-updateConfirm	[RFC5934]	2.16.840.1.101.2.1.2.77.4
TAMP-apexUpdate	[RFC5934]	2.16.840.1.101.2.1.2.77.5
TAMP-apexUpdateConfirm	[RFC5934]	2.16.840.1.101.2.1.2.77.6
TAMP-communityUpdate	[RFC5934]	2.16.840.1.101.2.1.2.77.7
TAMP-communityUpdateConfirm	[RFC5934]	2.16.840.1.101.2.1.2.77.8
TAMP-seqNumAdjust	[RFC5934]	2.16.840.1.101.2.1.2.77.10

TAMP-seqNumAdjustConfirm	[RFC5934]	2.16.840.1.101.2.1.2.77.11
TAMP-error	[RFC5934]	2.16.840.1.101.2.1.2.77.9
keyPackageReceipt	[ID.housley-keypackage-receipt-n-error]	2.16.840.1.101.2.1.2.78.3
keyPackageError	[ID.housley-keypackage-receipt-n-error]	2.16.840.1.101.2.1.2.78.6

[5. Security Considerations](#)

See the answer to the Security Considerations template questions in [Section 2](#).

[6. Acknowledgments](#)

Special thanks to Carl Wallace for generating the example in [Section 3](#).

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